



Chuang 2000-0071

**METHOD FOR NEAR OPTIMAL JOINT CHANNEL ESTIMATION  
AND DATA DETECTION FOR COFDM SYSTEMS**

**Related Applications**

- [001] This application claims the benefit of priority of Provisional Application No. 60/241,195, filed on October 19, 2000, and of Provisional Application No. 60/180,799, filed on February 7, 2000, and is related by subject matter to U.S. Patent 6,477,210, entitled "System for Near Optimal Joint Channel Estimation and Data Detection for COFDM Systems," by the inventors of the present application filed concurrently herewith.

**Field of Invention**

- [002] The invention relates generally to communications and particularly to a method and apparatus for near optimal joint channel estimation and data detection to improve channel tracking and, thus, improve link robustness.

**Background of the Invention**

- [003] The rapid growth in the use of the Internet and the increasing interest in portable computing devices have triggered the desire for high-speed wireless data services. One of the more promising candidates for achieving high data rate transmission in a mobile environment is Orthogonal Frequency Division Multiplexing (OFDM), which divides the wide signal bandwidth into many narrow-band subchannels, which are transmitted in parallel. Each subchannel is typically chosen narrow enough to eliminate the effects of delay spread. Coded OFDM (COFDM) systems, which combine both OFDM and channel coding techniques, are able to improve the performance further by taking advantage of frequency diversity of the channel.
- [004] Though both differential and coherent demodulation can be applied in a COFDM system, the latter leads to a performance gain of 3 to 4 dB in signal-to-noise ratio (SNR) with accurate channel estimation. Channel estimation techniques realized by a frequency-domain filter using Fast Fourier Transform (FFT), followed by time-domain filters for a COFDM system with Reed-Solomon (RS) coding have been proposed. These channel estimation